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Choice and Equality

Are vulnerable citizens worse-off after liberalization reforms?¹

ABSTRACT

In recent decades, we have witnessed a massive restructuring of public service delivery mechanisms, including service liberalization reforms, the pursuit of the choice agenda and the creation of quasi-markets. A central aim of these reforms is that citizens receive better value for money through greater competition among service providers. However, it is debated whether all layers of society are equally able to benefit from these developments. We assess the equality in citizens' choice behaviour with regard to liberalized services of general interest across 25 countries of the European Union. Our findings show that the gap between lesser and better educated service users, in terms of actual switching behaviour, widens once a considerable degree of service liberalization, as evidenced by the number of service providers, has been achieved. However, this has been only found in the mobile telephony sector and not in the less competitive market of fixed telephony services.

Keywords: Equality, liberalization reform, public services, provider choice, vulnerability

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INTRODUCTION

Although citizens' responses to poorly performing public services have featured on the research agenda for some time (see most prominently Hirschman 1970; Lyons *et al.* 1992), recent years have seen an upsurge in interest in studying responses to public services, including citizen satisfaction (Van Ryzin and Charbonneau 2010; James 2009), their behaviour when dealing with poor performance (Gofen 2012; Jilke and Van de Walle 2013) and the link between these two aspects (Dowding and John 2011, 2012; Salucci and Bikers 2011). Following large-scale public service reforms, such as service liberalization, the pursuit of the 'choice agenda' and the creation of quasi-markets (Clifton and Diaz-Fuentes 2010; Le Grand 2007), attention has been drawn to the outcome of these reforms for ordinary citizens (Clifton *et al.* 2011a, 2012; Florio 2013; Grosso and Van Ryzin 2012).

A central aim of these reforms was that citizens, now perceived of as consumers (Clarke *et al.* 2007), would receive greater value for money through competition among providers. Public service users, in turn, were thought to be able to make well-informed choices and opt for the optimal service provider (European Commission 2004). However, it is debated whether all layers of society are equally able to do so. Commentators have claimed that the marketization of public service delivery and the insertion of greater choice into the public sector might well have fostered a 'two-track' public service where so-called potentially vulnerable service users are less likely to benefit from public service reforms than their relatively 'strong' counterparts (Clifton *et al.* 2011a; Needham 2003). Despite these concerns, substantive evidence of negative effects of greater choice on equality in public service provision is lacking.

In France they have a saying "*trop de choix tue le choix*", meaning that too much choice kills the choice (Economist 2010). While most experiences within the public sector reject the notion that increasing choice necessarily leads to a halt in using the service or an end to switching providers (e.g. Le Grand 2007), in this paper we go one step further by investigating whether 'too much' choice harms the choices made by lower socio-educational groups - those who are regarded as potentially vulnerable service users. In this study, we examine the cognitive ability element of vulnerability by looking at service users educational attainment. We investigate whether 'too much' choice harms the choices made by potentially vulnerable service users, such as those who are less well educated. We offer an empirical look at equality in

citizens' choice behaviour (switching to another service provider) when it comes to liberalized services of general interest, and particularly in terms of mobile and fixed telephony, in 25 countries of the European Union (EU), by asking if potentially vulnerable service users become less likely to switch away from their current service provider once the number of providers increases. Doing so, this article is structured as follows: the next section introduces liberalization reforms in services of general interest and studies that have looked at their effects on citizens' attitudes and behaviours. We then address the commonly articulated reproach - that reforms for greater provider choice foster inequalities between service users - and discuss the theoretical and empirical literature regarding reforms in the 'services of general interest' telecommunications sector. Drawing upon the literature on biases in decision-making, we develop our theoretical framework. Subsequently, we introduce our data, measures and methodology, and then test our theoretical framework. Finally, we discuss the findings from statistical tests and extract implications for theory and practice.

LIBERALIZING PUBLIC SERVICES AND ITS EFFECTS ON CITIZENS

The European integration process and the creation of a single market fostered the liberalization of services of general interest and made them subject to greater competition (Héritier 2001; Prosser 2005), leading to the creation of liberalized markets for public service provision (Clifton and Diaz-Fuentes 2010). These markets seek to overcome the market failure situations that typically occur when public services are provided through a monopolistic provider, by establishing a market environment where, ideally, multiple service providers compete for customers (Savas 1987; Ostrom and Ostrom 1971). Further, through market signalling, this is expected to create incentives for providers to deliver greater value for money in order to keep existing customers as well as attract new ones. A key attribute in the provision of services of general interest such as water, electricity, or telecommunication services, is that the classical exit option of completely withdrawing from the service in question is often not feasible, too difficult, associated with extremely high costs (see Clifton *et al.* 2011a), or even may harm citizens' individual welfare. Services of general interest are, furthermore, regarded as essential public services and "*[...] subject to specific public service obligations by virtue of a general interest criterion*" (Commission of the European Communities 2004, cited after

Van de Walle 2008, 7; see also Clifton and Diaz-Fuentes 2005; 2010). It is because of this general interest character that equality in terms of accessibility and the provision of services of general interest, is regarded as crucial in all EU member countries (Clifton, Comin, Diaz-Fuentes, 2005; Prosser 2005).

For citizens, changing the delivery and supply arrangements of services formerly provided by public monopolies meant that they were no longer regarded as mere legal subjects, but as vocal and empowered consumers (Aberbach and Christensen 2005; Clarke *et al.* 2007). They were put in a position to autonomously make choices as to which service providers best matched their needs and demands. Experiences in the US telecommunications sector showed that service users were indeed more likely to be better off after switching (Eppling 2003), while evidence from the UK's electricity market suggests that some service users failed to identify the appropriate supplier for their levels of consumption (Wilson and Waddams Price 2010). However, greater provider choice has not always become available within all the liberalized sectors in the EU. The rail transport sector, for example, has remained strongly regulated in most countries, whereas competition and choice is observable in many EU member countries in terms of mobile telecommunications (Conway and Nicoletti 2006; European Commission 2010).

The general process of public service liberalization has been criticized as mainly advantaging the comparatively strong and well-positioned service users, and leaving behind those who are viewed as potentially vulnerable, such as the low educated (Clifton *et al.* 2011a; also Gottfried 2001). The literature suggests that while comparatively strong and well-educated service users are more prone to take decisions regarding the services they receive that come close to an optimum, when compared to potentially vulnerable service users. This can lead to a service delivery system where potentially vulnerable service users receive least value for money. In terms of services of general interest, numerous observers have shown that various potentially vulnerable service users are indeed least satisfied with the services they receive (Bacchiocchi *et al.* 2011; Clifton *et al.* 2011a; Ferrari *et al.* 2010; Florio 2013; Fiorio and Florio 2010; Poggi and Florio 2009). Moreover, liberalization reforms have been found to decrease service satisfaction across a whole range of services of general interest (Bacchiocchi *et al.* 2011; Ferrari *et al.* 2010; Fiorio and Florio 2010). However, no clear evidence is available about whether the gap in satisfaction levels between different socio-economic groups increases (or decreases) as liberalization reforms move on.

Other research on liberalization reforms has attempted to identify inequality effects on public service users' actual market behaviour or their financial situation within those markets (Clifton *et al.* 2011; Jilke and Van de Walle 2013; Poggi and Florio 2009). These studies find that inequalities in actual spending, complaints and experiencing financial problems in paying service bills are apparent for numerous groups of potentially vulnerable service users. However, empirically attributing these vulnerability-effects to the liberalization reforms proves difficult. For example, it may also be possible that potential vulnerable public services users were already in disadvantaged positions prior reforms took place. This clearly justifies further research. Furthermore, within this stream of the literature, there is little evidence available on the extent to which service users, and in particular those who are regarded as potentially vulnerable, exercise what was argued to be a core element of service liberalization reforms and greater competition - namely user choice.

EQUALITY AND CHOICE BEHAVIOUR IN LIBERALIZED PUBLIC SERVICE MARKETS

Few studies have examined equality in provider choice by looking at direct and/or indirect effects of socioeconomic aspects on service users' switching behaviours. Ranaganathan *et al.* (2006) show that young service users are more likely to switch their mobile providers than older users, arguing that this is a reflection of their active market behaviour and high service usage (see also Grzybowski 2008). Eppling (2002) studied the effects of switching on price discrimination among different users groups. Her results indicated that non-switchers were more likely to have paid higher prices. Her findings further showed that education is positively and income negatively related with switching – that the poor seem to more actively search for better offers. Because of this they also may end up with better offers. Regards education, the author explained her finding by arguing that information is crucial for making choices and finding a better provider, and that the more highly educated service users were more likely to have better access to information. This is so because low search costs are crucial to identify an optimal provider. Moreover, they have greater cognitive abilities to process such information and thus experience greater transaction costs in accessing and processing needed information. Hence, there is considerable evidence that service

users who are regarded as potentially vulnerable, such as those who are less well educated, face greater hindrances in making 'optimal' choices because of the increased transaction costs they face in accessing, processing and comparing information. However, one also has to consider the distinct dimensions of vulnerability, income and education, tap in. While the relationship between income and choice is rather rational and most likely also related to search opportunity costs, the negative relationship between education and switching stems from structural disadvantages these vulnerable service users face.

The structural disadvantages potential vulnerable services users, such as those with a low level of education, have in choosing among service providers is further reinforced by insights from decision theory. This stream of the literatures suggest that as the amount of information to be processed grows, decision-making becomes poorer and also less likely (Chen *et al.* 2009; Hwang and Lin 1999; Lee and Lee 2004). This is mainly because individuals have limited capacities to deal with information for making decisions, and when those limits are reached, individuals tend to become confused (Miller 1956; Timmermanns 1993). As a result, the likelihood of staying with one's current service provider increases because this represents a safe haven, a so-called 'satisficing' option – a situation which has been more generically described as a 'status-quo bias' (Samuelson and Zeckerhauser 1988). Related to this idea is the concept of default-effects (Wilson, Garrold and Munro 2013), where individuals have a tendency to stay with the status-quo even when switching would potentially benefit them. Here it is argued that the reason why people often stick with the default are not only the *direct* transaction costs such as actual switching costs, but also related to *indirect* transaction costs such as search costs (see also Wilson 2012).

Studies in the field of applied psychology indicate that increasing the number of alternatives first results in a positive effect on consumers' choice behaviour, but eventually the effect becomes negative (Botti and Iyengar 2006, 2004; Iyengar and, Lepper 2000; Schwartz 2005; Shah and Wolford 2007), supporting the assumptions linked to information overload. Iyengar and Lepper (2000) were able to identify choice overload in a simple buying environment using a rather large number of alternatives (24), as have later studies (Botti and Iyengar 2006, 2004). In this regard, Shah and Wolford (2007) highlight the existence of a tipping point (between 10 and 12 alternatives) when there are too many alternatives to choose from, turning choice into too much choice. However, in the case of public service delivery, the number of

alternatives or available service providers citizens can choose from is typically smaller - we found a maximum of 13 service providers within mobile, and 10 within fixed, telephony markets.

The fact that individual capabilities in processing information vary among different socio-educational groups, as does the propensity for taking a risk based on a possibly poor decision (Dohmen *et al.* 2010; Falch and Sangren 2006; Hjorth and Fosgerau 2010), means that potentially vulnerable service users are more likely to be risk-averse in terms of their switching decisions. This is mainly so because of their limited capacities in processing and evaluating necessary information, and the higher search costs they face. But choosing among an increasing set of options requires an increase in cognitive effort (Keller and Staelin 1987). Or in other words, increasing the number of choices affects consumers' search costs to collect and interpret data on a variety of different offers, increasing their indirect transaction costs. Furthermore, in markets with an increasing number of providers to choose from, price discrimination and obfuscation are more prevalent, which further increases the complexity of choosing among a large set of providers. This further increases search costs for service users. We, moreover, argue that citizen-consumers experience differing degrees of search costs, based on their level of vulnerability. This results in default-effects, and these default-effects increase with their level of vulnerability. If this is the case, then we would assume that, as the number of alternatives grows, the gap between different types of service users will widen. In other words, the difficulty in figuring out the optimal service offer increases as the number of service providers increases. That is, determining the optimal provider becomes more difficult for this particular group of public service users and making a choice then represents a risk to them. As a result, they are more likely to stick with their current provider and tend to become 'locked-in'. This leads to the research question we aim to address in this study: *Do potentially vulnerable service users - compared to less vulnerable users - become less likely to switch away from their current service provider once the number of providers increases?*

THE EUROPEAN TELECOMMUNICATION SECTOR

In this study, we look into citizens' switching behaviour in a strongly marketized service sector - telecommunications. The European telecommunication sector has not only undergone liberalization reforms across all EU member countries, it also provides sufficient variance in the degree to which

reforms have resulted in greater competition and an increase in the number of service providers (European Commission 2010; Conway and Nicoletti 2006). In this sense, the European telecommunication sector has experienced a strong wave of liberalization efforts in the 1990s, aiming at the withdraw of market entry barriers and establishing a common European telecommunication market (Conway and Nicoletti 2006; see also Clifton, Comin and Diaz-Fuentes 2007). This was indeed one of the most ambitious liberalization projects of the European Commission (Belloc, Nicita and Parcu 2013), which served as an European-wide 'laboratory' for provider choice. However, while Conway and Nicoletti (2006) and their OECD-wide compilation of regulatory indicators indicate massive liberalization efforts, there remain some variation across countries. This is especially true with regard to effective competition between service providers within national markets. Thus one can see that we have an European telecommunication market that is on the one side highly liberalized, but on the other side differs with regard how those reforms have resulted in greater competition among providers, and choices available to citizens. This makes it an ideal case for our subsequent empirical analysis.

DATA AND METHODOLOGY

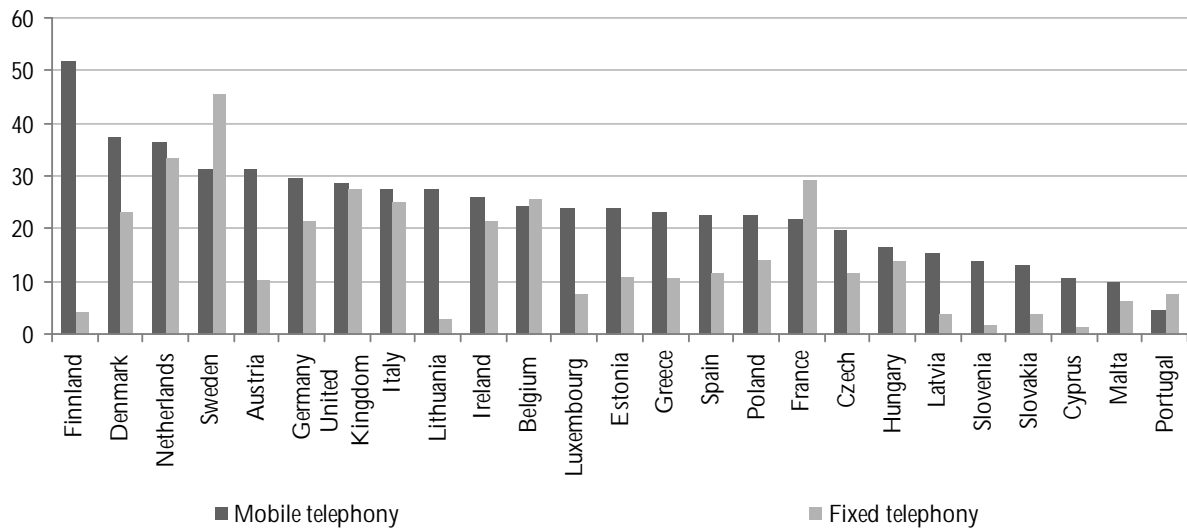
We use data from the European Commission's Eurobarometer project. Eurobarometer surveys are known for their high quality and methodological rigour in both survey design and data collection. Adopting a multistage, random probability sampling procedure, information is collected, through face-to-face interviews at respondents' homes (GESIS 2010) - yielding a total of 24,815 respondents. In our study, we use data from Eurobarometer 65.3 on services of general interest (European Commission 2006). The survey was fielded 2006 in 25 EU member countries. We filtered out those respondents who were not service users and deleted cases with item non-responses. This resulted in a sample of 15,143 mobile service users and 13,422 fixed telephony users.

Dependent variables

In our study, we examine individual level switching behaviour in 2006 within the mobile and fixed telephony sectors of the 25 member countries then part of the EU. Here, Eurobarometer 65.3 contains

relevant information on citizens' switching behaviours in both sectors. More precisely, respondents were asked '*Have you tried to or thought about switching your [insert service] provider in the last two years?*'. Possible answers were: 1 '*Yes, you switched and it was easy*', 2 '*Yes, you switched but it was difficult*', 3 '*Yes, you tried to switch but you gave up switching due to obstacles you faced*', 4 '*No, you did not try because you are not interested in switching*' and 5 '*No, you did not try because you thought it might be too difficult*'. Our interest is in whether public service users have actually switched providers, and therefore we coded this as a dichotomous variable. Respondents that indicated that they had switched providers in the past two years were coded as '1' while the non-switchers were coded as '0'. Overall, 18% of fixed telephony and 25% of mobile telephony users had switched their providers within the period surveyed. Figure 1 provides a disaggregated overview of switchers for both sectors and one can clearly see that there are significant differences in switching behaviour across countries.

FIGURE 1: Service users' switching behaviour (percentages)



Source: Own calculations using EB65.3 data

Potential vulnerability

We argue that citizens' switching behaviour differs in accordance to their vulnerability, which has been argued of being a latent concept - meaning that it is not directly observable. While potential-vulnerability can be operationalized in various ways (see for example OECD 2008), a low educational attainment has been one of the most remarkable and repeatedly used operationalizations (for example Burden 1998; Clifton *et al.* 2011a, 2011b; George *et al.* 2011; Jilke and Van de Walle 2013). This is not without a reason, educational attainment represents a particular element of the concept of vulnerability, that is cognitive ability. It largely affects consumers resources for participating in the market (Hogg *et al.* 2007). On the one side education impacts the development of skills for consumer empowerment, including the acquisition of information and the knowledge of how to interpret them (Brennan and Coppack 2008). On the other side, as suggested by Clifton *et al.* (2011), a low level of formal education is strongly associated with people's more limited resources for processing and evaluating information (see also Dohmen *et al.* 2010; Hjorth and Fosgerau 2011). For our study, we look at the cognitive ability element of the concept of vulnerability, as we argue that especially people's cognitive resources affect their choice behaviour. Doing so, we grouped respondents, based on their age when they left fulltime education, into three categories:

basic education, secondary education and higher education. Respondents who were still studying were assigned to one of the three categories based on their current age.

Number of service providers

The degree of choice that is available to public service users is measured through the number of service providers within national telecommunication markets. The European Commission provides estimates of the number of service operators within both telephony sectors. However, these numbers are based on different national definitions of which providers to include, and thus do not allow cross-national comparison. Therefore, we established our own values using a common definition of service provider: a public or commercial organization that provides voice telephony services on a national basis, thereby excluding, for example, those that offer only international calls. Service providers were identified from national network agencies and provider websites through an extensive web-search. This data has been collected by the author. We individually measure the number of providers of mobile and of fixed telephony who had entered the respective telephony market prior to January 2005.

Control variables

We controlled for a number of other socioeconomic variables, namely gender, age, employment status, place of residence and homeownership. Males have been shown to be more likely to switch their service provider and this is perceived to be because of their greater interest in technological innovation (Ranaganathan *et al.* 2006). Furthermore, we take into account that the elderly are thought to be less active in their switching behaviour. Thus we control for respondents' age. Income has been shown to be negatively correlated with the likelihood of switching, as poorer people are more in need of better service offers (Eppling 2002). Given data limitations, we are not able to directly measure respondents' incomes or wealth status, and instead use homeownership and employment status as proxy indicators. The place of residence should also be critical in providing services of general interest, as it is often argued that rural areas tend to be under-provided (Clifton *et al.* 2011b). We therefore also controlled for a respondent's place of residence.

We also control for individual perceptions of service delivery, reflected in aspects such as the daily importance of the service, and switching barriers. Earlier studies into telecommunication switching behaviour have indicated the importance of service usage (Ranaganathan *et al.* 2006), with frequent users being more likely to change their provider. Thus, we control for the perceived importance of the services used daily, using a four-point Likert scale ranging from not at all important to very important. Another important aspect when it comes to switching behaviour in telecommunications is the barriers to switching (Kim *et al.* 2004; Lee *et al.* 2001). Hence, we take into account public service user's perceptions of switching barriers, namely their evaluations of the ease of comparing offers from different providers and the extent to which consumer interests were protected. The ease of comparing offers was measured in the original survey using a four-point Likert scale ranging from 'very difficult' to 'very easy'. Additionally, respondents had been asked to assess how well consumer interests were protected within each service market using a four-point Likert scale ranging from 'very badly' to 'very well'.

On the country level, we control for institutional switching barriers, for the average price for making a call, the total number of subscribers, and the market concentration. In terms of barriers to switching, we include measures for both the services being considered. Within national markets, the number portability rate - that is the average number of days it takes to transfer a phone number from one provider to another - is commonly applied as a measure of switching barriers (see European Commission 2010). Here, we chose to use the official figures for average number portability between two providers, as reported by the European Commission (2008). We also control for the actual price levels of the services. For fixed telephony, we use the costs of a ten-minute local call. In terms of mobile telephony, we use the average price per minute of a voice communication (European Commission 2009, 2010). However, since absolute price levels differ among countries, we have adjusted these prices by weighting them with their respective Purchasing Power Parities for 2006. Further, we recognize that the number of service providers may not only reflect the degree of market liberalization but also the size of the market. To control for this, we include the total number of network subscribers in 2006 as one of our country-level predictors. To also control for different degrees of market concentration within national markets, we added the Hirschman-Herfindahl index (fixed telephony)/ Concentration ratio (mobile telephony) for service operators to our models.

Modelling strategy

Given the hierarchical structure of our data, individuals nested within countries, multilevel modelling techniques are required since these are able to correct for potential clustering effects and unobserved heterogeneity across countries (Hox 2002). Moreover, in order to be able to model individual level predictors of a binary dependent variable (in our case, citizens' choice behaviour) *and* country level individual variables simultaneously, we estimate a logistic random intercept model. In our analysis, we grand mean centre all our continuous predictors such that the intercept can be interpreted as the value (in terms of the used indicators) attached to the average respondent. Our main individual level predictor education has been group mean centred as we are interested in the individual within-country effects of education, and not in structural differences across countries (Enders and Tofighi 2007).

RESULTS

For both mobile (Table 1) and fixed (Table 2) telecommunication services, we estimate three separate models. In the two tables, we report odds ratios and standard errors (in parentheses) but, because of space considerations, only the results from our main variables of interest are reported here, with complete results being included in the annex. The null model reflects an intercept-only model, which helps to assess how much of the variance can be attributed to differences between countries. In a second step, we added all our independent variables to the models, ignoring any potential interaction between the number of service providers and respondents' level of education. In the third model, we added cross-level interaction terms between choice and education. As regards mobile telephony, each model significantly improved its fit over the previous model (Table 1). This is reflected in the significant decrease in deviance (-2 Log likelihood) when applying a likelihood-ratio test. In the mobile telephony analysis, the intercept-only model revealed an interclass correlation of .101 indicating that roughly 10% of the total variance can be attributed to country differences. Our final model explains 54% of the variance that lies between countries.

TABLE 1: Modelling citizens' switching behaviour towards mobile telephony services (EU25)

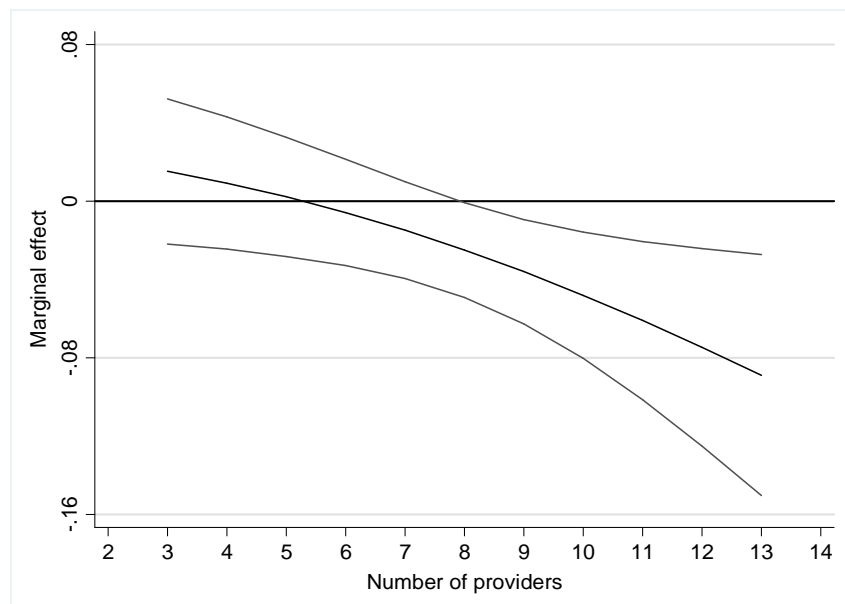
	Model 0	Model 1	Model 2
Intercept	.292** (.036)	.195** (.045)	.195** (.045)
Number of service providers		1.112* (.052)	1.113* (.052)
Basic education (<i>Ref</i> : higher education)		.864* (.059)	.896 (.063)
Secondary education (<i>Ref</i> : higher education)		.917 (.042)	.933 (.044)
Number of service providers X Basic education			.950* (.023)
Number of service providers X Secondary education			.965* (.015)
Variance: country intercept (SE)	.609 (.091)	.435 (.068)	.435 (.068)
Deviance	16,359.92	16,016.05	16,009.39
Interclass correlation	.101	.054	.054
N (Individuals)	15,143		
N (countries)	25		

Note: Results of control variables are provided in the annex; Odd ratios with standard errors in parenthesis are reported; significance levels: *p<0.05; **p<0.01;

Many of the control variables made a statistically significant contribution to our models, and confirmed the expected effect directions. For example, females are also less likely to switch, so as those respondents that own a house, or are older than 69 years. Respondents that place a great daily importance on their mobile service are more likely to switch, so as those public service users that think there is no good protection of their consumer interests. Moreover, our main predictors of interest have the expected effects: being comparatively low educated decreases the likelihood of switching mobile service providers. Considering our level-2 predictors, our findings show that when the number of mobile service providers increases, the probability of switching also increases. This supports the notion that a greater choice does lead to a situation where service users are more likely to opt for another provider. We also find that a greater level of market concentration is associated with lower switching rates. The other country-level control variables were not statistically significant, but the indicated effects were in the expected directions.

Turning to the hypothesized interaction between education and the number of service providers, we find that our interaction term between being low educated and the number of service providers turns statistically significant. Thus, there is initial evidence for an interaction between education and greater choice. We further examined this relationship and calculated the marginal effects of basic education on switching (compared to a high level of education), contingent on the number of service providers, keeping all the other predictors constant at their mean values (see Brambor *et al.* 2006). The resulting graph (Figure 2) reveals an interesting picture: the initially positive marginal effect on switching turns negative with more than five providers, but if we instead consider the 95% confidence interval then the band includes zero up to eight providers. This means that typically there is unlikely to be a negative effect of being low educated on the probability of switching within countries where there are less than eight mobile providers. However, if there are more than eight providers, the marginal effect of a low level of education on switching is clearly negative. Moreover, the revealed effect size is nontrivial; we find in national markets with 13 providers that individuals who are low educated are 9% less likely to switch when compared to their better-off counterparts. The 95% confidence bounds range between 3% and 15%. On the other side, in markets with 8 providers or less, there are no significant differences between low and well educated respondents. This shows that once the number of service providers reaches a threshold of eight service providers, less-educated service users become less likely to switch.

FIGURE 2: Marginal effects of being low educated on the probability of switching mobile services contingent on the number of providers (95% confidence intervals)



We now turn to the results of our estimations for fixed telephony services (see Table 2). Here, the intercept-only model has an interclass correlation of .23, which means that 23% of the total variance in switching behavior is on level-2. Overall, model 1 significantly improves its fit over the intercept-only model by including additional parameters. However, our interaction model (Model 2) did not significantly improve its fit over model 1 - the difference between the deviances of the two models is too low to satisfy conventional significance levels. This indicates that our interaction terms fail to make a valuable contribution to explaining users' switching behaviour. In terms of our control variables, some were found to be statistically significant, with effects in the anticipated directions. For example, respondents that regard the consumer interest protection in their country as bad are less likely to switch providers. Also, the elderly and those who are living in rural areas are less likely to exercise choice. Turning to our main predictors of interest, as expected, being less-well educated decreases the likelihood of switching service providers. This is in line with findings from the mobile telephony sector.

TABLE 2: Modelling citizens' switching behaviour towards fixed telephony services (EU25)

	Model 0	Model 1	Model 2
Intercept	.131 (.027)	.048** (.016)	.084** (.043)
Number of service providers (log)		2.888** (.413)	1.716 (.678)
Basic education (<i>Ref:</i> higher education)		.693** (.054)	.553* (.128)
Secondary education (<i>Ref:</i> higher education)		.845** (.048)	.824** (.054)
Number of service providers (log) X Basic education			1.161 (.168)
Number of service providers (log) X Secondary education			1.015 (.021)
Variance: country intercept (SE)	.995 (.149)	.283 (.056)	.274 (.053)
Deviance	11,355.11	11,119.03	11,115.81
Interclass correlation	.231	.024	.022
N (Individuals)	13,422		
N (countries)	25		

Note: Results of control variables are provided in the annex; Odd ratios with standard errors in parenthesis are reported; significance levels: *p<0.05; **p<0.01;

On the country level, including the number of service providers did yield statistically significant estimates. Although the number of service providers has a positive effect on the likelihood of switching, it has a log-linear form, suggesting diminishing marginal effects of the number of alternatives on citizens' switching. Overall, this finding is in line with our results from the mobile telephony sector. Looking at country-level control variables, only our predictor of market concentration was found to be statistically significant. As the results for the mobile telephony sector do, this suggest that greater market concentration is associated with lower switching rates. The other controls do not reach conventional levels of statistical significance.

Evaluating our research question, we checked for a potential interaction effect between basic education and the number of service providers. While our statistical tests showed that education had indeed an individual effect on the likelihood of exercising choice, the data failed to identify any joint effect. Taking into account the identified interaction between education and the number of providers within the mobile telephony sector, our results regards the equality of liberalization reforms are mixed. An interesting question is why, with less well educated service users, an increasing number of service providers has a negative effect on the education-switching relationship only within the mobile sector? A first observation is that the mobile telephony market is much more strongly driven by new technological innovations that

require greater capabilities to follow than the fixed telephony market, which remains a relatively simple service. As such, the mobile service market can be regarded as a complex environment in which to make switching decisions, whereas, as observed by Iyengar and Lepper (2000), information overload is less likely to take place within rather simple environments. Moreover, the mobile telephony market is much more prone to competition with considerably more service providers on average (mean 7.1, standard deviation 2.9) than the fixed telephony market (mean 3.4, standard deviation 2.4). The negative effect of too great a choice therefore may only unfold if the respective service sector is characterised by a strong market orientation with a comparatively large number of options. In the mobile telephony sector, this threshold seems to be at eight providers.

DISCUSSION AND CONCLUSION

The introduction of choice and competition into public service delivery rests on the assumption that overcoming state monopoly-led provision of public services would result in a more efficient process of service delivery, and an increase in citizens' welfare (Le Grand 2007; Ostrom and Ostrom 1971; Savas 1987). For instance, this is done through shifting the autonomy for decision-making from the state to the citizen by creating markets for public services and letting service providers compete for customers. Public service users send market signals to suppliers by complaining, or switching service providers. As a result a better match between citizens' demands and preferences, and the price and quality of the offered services would emerge. However, in our analysis we have shown that potentially vulnerable and non-vulnerable groups of citizens do not send market signals in the very same manner to providers under different levels of choice. In terms of equality, we have found that increasing the number of choices that are made available to citizens appear to work better in some public services as fixed telephony than in others as mobile telephony, mostly due to characteristics as the competitiveness of the market, and the overall service complexity. However, the question is not whether to open public service delivery for competition and provider choice, or not, but rather how much choice works for a given service. Once 'too much' choice is made available a choice-gap is likely to emerge.

One has to note that our results indicate that liberalizing public services does not *per se* negatively influence the switching behaviour of potential vulnerable groups but that, for this to occur, a certain threshold of provider choice must be exceeded. The circumstances under which the introduction of choice negatively impacts on the switching decisions of the potentially vulnerable are not clear cut and may vary across different public service sectors. We have identified criteria that, if satisfied, could result in liberalization reforms creating a 'choice-gap'. This can occur if the public service sector exhibits a strongly liberalized and competitive environment with a high number of providers. Further, we suspect that the less complex an actual service is, the higher the number of providers needs to be before the negative potential becomes a reality. However, these criteria should be subjected to further testing by future research.

There are, of course, some limitations of our analysis which we believe could be addressed by future research. In terms of the generalizability of the results, we cannot confidently claim that similar effects would be found for other types of public services such as employment services, gas, electricity or health care. Thus, future studies may look whether our results hold true for other types of public services. Furthermore, the availability of choice, or number of service providers within national markets, is a key goal of the EU liberalization agenda and has been argued to be positively related to the degree of competition within countries. However, the market share of single providers may differ across countries and thus not necessarily equate with the degree of competition. Our data does not allow to examine the overall market share of single providers, as such data is not publicly available (only on the level of operators). Instead, this study focuses on the availability of choice to public service users, and not competition *per se*, while controlling for the actual market concentration (using the Herfindahl-Hirschman index/ concentration-ratio for service operators). We argue that it is important to estimate the relationship between the number of available alternatives in national markets and vulnerability, because a great variety of service offers was a key policy goal in the implementation of liberalization policies across the EU. Thus how service users respond to an increasing number of telephone providers within national markets is an important question of theoretical and practical pedigree. Furthermore, the exclusion of a measure for public service users' income may bias our results. To account for this, we used income-related (state-of-the-art) proxies as control variables, including respondents' homeownership and employment status. We

also need to acknowledge the cross-sectional nature of our data. While we account for wide range of control variables at both, the individual and country level, we cannot confidently rule-out that our findings may be affected by other unobserved factors, or reverse-causality. Instead, what this study can do is to pinpoint an association between vulnerability and switching behaviour, which increases with a growing amount of options to choose from. Future studies are well advised to collect time series data for citizens' switching behaviour to cross-validate our result. For now, our study results clearly show the interesting relationship between citizen vulnerability and decision making in public service markets.

Our study has some important implications for policy makers and regulators. We have shown that an increased number of options to choose from can have heterogeneous effects on the switching behaviour of vulnerable and non-vulnerable service users. However, for this effect to unfold, a certain threshold must be reached (in our case eight providers), and the market needs to be strongly de-regulated. This may suggest to limit the number of licences awarded to providers in de-regulated markets. However, instead we would argue that potential vulnerable services users should rather receive greater attention in consumer protection policies. Most policy attention has gone into reducing switching costs (e.g. number portability rates), instead search costs seem to be as important. Thus establishing independent agencies that provide easily available information on service offers could be one possible responses to an increased market complexity, and help to reduce the 'choice-gap'. Another possible way to account for an increasing inequality in citizen choice behaviour could be service obligation contracts that protect the vulnerable. Such contracts outline arrangements between non-public service providers and the regulating public bodies (for an overview see Cheung 2005). They could, for example, include guidelines to strengthen the market situation of vulnerable customers across the EU. Additionally, organizing collective switching schemes, as in the electricity market in the UK (see for example UK Department of Energy and Climate Change 2013), could also be one interesting way to overcome inequalities in citizens' choice behaviour. In such switching schemes municipalities select providers for a large group of service users on a tender basis and then collectively switch to the one with the best service offer. Enrolment in such schemes is relatively easy and straightforward. However, whether this can accurately reflect heterogeneous consumer preferences – especially in the mobile telephony market – is not clear and should be the subject of future studies.

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ANNEX

TABLE 3: Individual-level descriptive statistics

	Mobile services (N= 15,143)			Fixed services (N=13,422)		
	Mean	SD	Min; Max	Mean	SD	Min; Max
Education			1; 3			1; 3
<i>Basic education</i>	.151	.358	0; 1	.205	.205	0; 1
<i>Secondary education</i>	.488	.500	0; 1	.447	.447	0; 1
<i>Higher education</i>	.361	.480	0; 1	.348	.348	0; 1
Daily importance			1; 4			1; 4
<i>Not at all important</i>	.014	.118	0; 1	.013	.115	0; 1
<i>Not very important</i>	.109	.312	0; 1	.112	.315	0; 1
<i>Fairly important</i>	.322	.467	0; 1	.404	.491	0; 1
<i>Very important</i>	.555	.497	0; 1	.471	.499	0; 1
Easy to compare			1; 4			1; 4
<i>Very difficult</i>	.107	.309	0; 1	.105	.307	0; 1
<i>Fairly difficult</i>	.228	.420	0; 1	.253	.435	0; 1
<i>Fairly easy</i>	.403	.491	0; 1	.420	.494	0; 1
<i>Very easy</i>	.261	.439	0; 1	.222	.416	0; 1
Consumer interest protection			1; 4			1; 4
<i>Very badly</i>	.056	.230	0; 1	.055	.228	0; 1
<i>Fairly badly</i>	.222	.416	0; 1	.214	.410	0; 1
<i>Fairly well</i>	.608	.488	0; 1	.605	.489	0; 1
<i>Very well</i>	.114	.318	0; 1	.126	.332	0; 1
Age (Ref: 15-69 years old)	.050	.217	0; 1	.125	.330	0; 1
Gender (Ref: female)	.462	.499	0; 1	.448	.497	0; 1
Employment categories			1; 6			1; 6
<i>Managers and professionals</i>	.141	.348	0; 1	.139	.346	0; 1
<i>Clerical workers</i>	.220	.415	0; 1	.195	.397	0; 1
<i>Self-employed</i>	.065	.246	0; 1	.066	.248	0; 1
<i>Working class</i>	.148	.356	0; 1	.115	.319	0; 1
<i>Unemployed</i>	.059	.235	0; 1	.043	.203	0; 1
<i>Not in Labour force</i>	.367	.482	0; 1	.442	.497	0; 1
Place of residence			1; 3			1; 3
<i>Rural village</i>	.337	.473	0; 1	.359	.480	0; 1
<i>Small/ middle town</i>	.387	.487	0; 1	.375	.484	0; 1
<i>Large town</i>	.276	.447	0; 1	.266	.442	0; 1
Homeownership	.460	.498	0; 1	.513	.500	0; 1

TABLE 4: Country-level descriptive statistics

	Mean	SD	Min, Max	Data source
Number of Service Providers (mobile)	7.080	2.929	3; 13	Own collection
Number of Service Providers (fixed)	3.440	2.399	1; 10	Own collection
Portability (in days) (mobile)	6.580	5.179	1; 20	European Commission
Portability (in days) (fixed)	9.080	6.855	0; 30	European Commission
Price (in Euros, PPP adjusted) (mobile)	.150	.058	.05; .27	European Commission
Price (in Euros, PPP adjusted) (fixed)	.366	.135	.19; .75	EUROSTAT
Concentration Ratio (mobile)	47.520	14.104	25; 94	EUROSTAT
Herfindahl Hirschman Index (fixed)	6186.360	2202.385	2717; 9791	EC
Subscribers (in thousands) (mobile)	19910.480	26042.187	347; 85700	EUROSTAT
Subscribers (in thousands) (fixed)	9229.720	13857.309	208; 54400	ITU

TABLE 5: Results (additional to Tables 1 and 2)

	Mobile telephony		Fixed telephony	
	Model 1	Model 2	Model 1	Model 2
Control variables				
<i>Daily importance (Ref: Not at all important)</i>				
Not very important	1.397 (.272)	1.403 (.273)	1.333 (.331)	1.336 (.333)
Fairly important	1.661** (.314)	1.662** (.315)	1.234 (.298)	1.240 (.300)
Very important	2.066** (.388)	2.071** (.390)	1.471 (.354)	1.476 (.356)
<i>Easy to compare (Ref: Very difficult)</i>				
Fairly difficult	1.114 (.080)	1.116 (.081)	1.134 (.098)	1.132 (.098)
Fairly easy	1.263** (.090)	1.268** (.091)	1.117 (.095)	1.115 (.095)
Very easy	1.565** (.119)	1.570** (.119)	1.434** (.134)	1.433** (.134)
<i>Consumer interest protection (Ref: Very badly)</i>				
Fairly badly	.935 (.082)	.932 (.082)	.980 (.107)	.980 (.107)
Fairly well	.681** (.058)	.680** (.058)	.728** (.076)	.726** (.076)
Very well	.731** (.074)	.730** (.074)	.684** (.084)	.682** (.084)
Age (Ref: 15-69 years old)	.463** (.054)	.465** (.054)	.747** (.068)	.744** (.068)
Gender (Ref: female)	1.091* (.044)	1.089* (.044)	.908 (.045)	.908 (.045)
<i>Employment category (Ref: Managers and workers)</i>				
Clerical workers	1.049 (.070)	1.046 (.070)	.993 (.081)	.996 (.081)
Self-employed	1.117 (.103)	1.117 (.103)	1.115 (.124)	1.120 (.124)
Working class	.987 (.076)	.983 (.075)	1.174 (.112)	1.182 (.113)
Unemployed	1.091 (.106)	1.092 (.106)	.939 (.125)	.944 (.126)
Not in Labour force	1.007 (.064)	1.007 (.064)	.864 (.068)	.867 (.068)
<i>Place of residence (Ref: large town)</i>				
Small/ middle town	.951 (.047)	.949 (.047)	.826** (.051)	.825** (.051)
Rural village	.917 (.048)	.914 (.048)	.835** (.053)	.836** (.053)
Homeownership	.772** (.035)	.772** (.035)	.912 (.051)	.912 (.051)
Number portability (in days)	.976 (.018)	.976 (.018)	1.018 (.011)	1.011 (.012)
Subscribers (in thousands)	1.000 (.000)	1.000 (.000)	1.000 (.000)	1.000 (.000)
Price (in Euros, PPP adjusted)	.987 (.017)	.987 (.017)	1.010 (.006)	1.011 (.006)
Market concentration	.982* (.008)	.982* (.008)	.999** (.000)	.999** (.000)